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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/620,973	07/15/2003	G. William Walster	SUN-P8507-SPL	9690

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EXAMINER

JONES, HUGH M

ART UNIT	PAPER NUMBER
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2128

DATE MAILED: 08/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/620,973

Applicant(s)

WALSTER ET AL.

Examiner

Hugh Jones

Art Unit

2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☒ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>061404, 101204</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 1-33 of U. S. Application 10/620,973, filed 7/15/2003, are pending.

Information Disclosure Statement

2. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. **Claim 1-33 are rejected under 35 U.S.C. 101 because the claimed invention is drawn to non-statutory subject matter since the claims are drawn to an abstract algorithm or disembodied program steps and are not concrete, useful and tangible.**

The Examiner submits that the claims as written, are merely drawn to nonstatutory descriptive material since the claimed abstract algorithm or program steps does not impart any functionality (let alone be stored on a tangible medium)). (i.e. not a computer program product or executable instructions embodied on a computer-readable medium). Analysis of the claim indicates that the claims are drawn to an abstract

algorithm or disembodied computer program steps and are not tangible. Furthermore, the claims are not useful and concrete. The claims are merely drawn to rearranging and forming subsets of numbers.

It is noted that claims 12-33 refer to either "hardware" or "storage medium". However, analysis of the claims in view of paragraph 30 of the specification indicates that the medium may not be tangible.

Note footnote 3 on page 6 of "Interval arithmetic in high performance technical computing."

5. *MPEP 2106 recites the following supporting rational for this reasoning:*

"Descriptive material can be characterized as either "functional descriptive material" or "nonfunctional descriptive material." In this context, "functional descriptive material" consists of data structures and computer programs which impart functionality when **employed as a computer component**. (The definition of "data structure" is "a physical or logical relationship among data elements, designed to support specific data manipulation functions." The New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).) "Nonfunctional descriptive material" includes but is not limited to music, literary works and a compilation or mere arrangement of data. **Both types of "descriptive material" are nonstatutory when claimed as descriptive material per se.** Warmerdam, 33 F.3d at 1360, 31 USPQ2d at 1759. When functional descriptive material is **recorded on some computer-readable medium** it becomes structurally and **functionally interrelated to the medium** and will be statutory in most cases since use of technology permits the function of the descriptive material to be realized."

6. *In this case, applicants have merely claimed an abstract mathematical algorithm that are not embodied on a tangible computer-readable medium and specifically employed as a computer component to be executed on a processor and perform the claimed limitations. Thus, Applicants have attempted to claim nonfunctional descriptive material.*

7. An invention which is eligible for patenting under 35 U.S.C. 101 is in the useful arts when it is a machine, manufacture, process or composition of matter, which produces a concrete, tangible, and useful result. *The fundamental test for patent eligibility is thus to determine*

whether the claimed invention produces a “useful, concrete and tangible result.” The test for practical application as applied by the examiner involves the determination of the following factors:

(1) Useful - The Supreme Court in *Diamond v. Diehr* requires that the examiner look at the claimed invention as a whole and compare any asserted utility with the claimed invention to determine whether the asserted utility is accomplished. Applying utility case law the examiner will note that:

(a) the utility need not be expressly recited in the claims, rather it may be inferred.

(b) if the utility is not asserted in the written description, then it must be well established.

8. Furthermore, although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

(2) Tangible - Applying *In re Warmerdam*, 33 F.3d 1354, 31 USPQ2d 1754 (Fed. Cir. 1994), the examiner will determine whether there is simply a mathematical construct claimed, such as a disembodied data structure and method of making it. If so, the claim involves no more than a manipulation of an abstract idea and therefore, is nonstatutory under 35 U.S.C. 101. In *Warmerdam* the abstract idea of a data structure became capable of producing a useful result when it was fixed in a tangible medium which enabled its functionality to be realized.

(3) Concrete - Another consideration is whether the invention produces a concrete result. Usually, this question arises when a result cannot be assured. An appropriate rejection under 35 U.S.C. 101 should be accompanied by a lack of enablement rejection, because the invention

cannot operate as intended without undue experimentation.

9. The Examiner respectfully submits, under current PTO practice, that the claimed invention does not recite a *tangible result*.

10. A claim that requires one or more acts to be performed defines a process. However, not all processes are statutory under 35 U.S.C. 101. Schrader, 22 F.3d at 296, 30 USPQ2d at 1460. To be statutory, a claimed computer-related process must either: (A) result in a physical transformation outside the computer for which a practical application in the technological arts is either disclosed in the specification or would have been known to a skilled artisan (discussed in i) below), or (B) be limited to a practical application within the technological arts (discussed in ii) below). See Diamond v. Diehr, 450 U.S. at 183-84, 209 USPQ at 6 (quoting Cochrane v. Deener, 94 U.S. 780, 787-88 (1877)) (“A [statutory] process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing.... The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence.”). See also Alappat, 33 F.3d at 1543, 31 USPQ2d at 1556-57 (quoting Diamond v. Diehr, 450 U.S. at 192, 209 USPQ at 10). See also id. at 1569, 31 USPQ2d at 1578-79 (Newman, J., concurring) (“unpatentability of the principle does not defeat patentability of its practical applications”) (citing O'Reilly v. Morse, 56 U.S. (15 How.) at 114-19). If a physical transformation occurs outside the computer, a disclosure that permits a skilled artisan to practice the claimed invention, i.e., to put it to a practical use, is sufficient. On the other hand, it is necessary for the claimed invention taken as a whole to produce a practical application if there is only a transformation of signals or data inside a

computer or if a process merely manipulates concepts or converts one set of numbers into another.

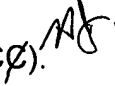
11. The claim merely recites an abstract mathematical algorithm. The claims are not concrete, useful and tangible.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. Claims 1-5, 7-9, 12-16, 18-20, 23-27, 29-31 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Walster (11/2000 – Intervals and HPC ϕ). 

14. Walster discloses:

1. A method for computing interval parameter bounds from fallible measurements, comprising: receiving a set of measurements $z_{\text{sub}.1}, \dots, z_{\text{sub}.n}$, wherein an observation model describes each $z_{\text{sub}.i}$ as a function of a p -element vector parameter $x=(x_{\text{sub}.1}, \dots, x_{\text{sub}.p})$; storing the set of measurements $z_{\text{sub}.1}, \dots, z_{\text{sub}.n}$ in a memory in a computer system; forming a system of nonlinear equations $z_{\text{sub}.i}-h(x)=0$ ($i=1, \dots, n$) based on the observation model; and solving the system of nonlinear equations to determine interval parameter bounds on x . (Walster: page 16 - the symbols are different, but it is the same teaching)

2. The method of claim 1, wherein the system of nonlinear equations is an "overdetermined system" in which there are more equations than unknowns (this refers to intended use for the method).

3. The method of claim 1, wherein each measurement $z_{\text{sub}.i}$ is actually a q -element vector of measurements $z_{\text{sub}.i} = (z_{\text{sub}.i1}, \dots, z_{\text{sub}.iq})^{\text{sup}.T}$, and h is actually a q -element vector of functions $h = (h_{\text{sub}.1}, \dots, h_{\text{sub}.q})^{\text{sup}.T}$. (Walster: pages 15-16 - also since ϵ is a q element vector, it follows by definition that z , h are also q -element)

4. The method of claim 1, wherein receiving the set of measurements involves receiving values for a set of conditions $c_{\text{sub}.1}, \dots, c_{\text{sub}.n}$ under which the corresponding observations $z_{\text{sub}.i}$ were made; and wherein equations in the system of nonlinear equations account for the conditions $c_{\text{sub}.i}$ and are of the form $z_{\text{sub}.i} - h(x_{\text{vertline}.c_{\text{sub}.i}}) = 0$ ($i=1, \dots, n$). (Walster: page 16 - the symbols are different, but it is the same teaching)

5. The method of claim 4, wherein each condition $c_{\text{sub}.i}$ is actually an r -element vector of conditions $c_{\text{sub}.i} = (c_{\text{sub}.i1}, \dots, c_{\text{sub}.ir})^{\text{sup}.T}$. (Walster: pages 15-16 - also since ϵ is a q element vector, it follows by definition that z , h , c are also q -element [it appears that " r " should be " q " here in order that the equation in claim 4 function])

7. The method of claim 4, wherein equations in the system of nonlinear equations are of the form $z_{\text{sub}.i} - h(x_{\text{vertline}.c_{\text{sub}.i}}) + \epsilon_{\text{sup}.}$

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$I(x, c_{sub.i})=0$ ($i=1, \dots, n$), which includes an error model $\epsilon_{sup.I}(x, c_{sub.i})$ that provides interval bounds on measurement errors for $z_{sub.i}$. (Walster: page 16 - the symbols are different, but it is the same teaching)

8. The method of claim 7, wherein if $z_{sub.i}$ is actually a q-element vector of measurements $z_{sub.i}=(z_{sub.il}, \dots, z_{sub.iq})^T$, then $\epsilon_{sup.I}$ is actually a q-element vector $\epsilon_{sup.I}=(\epsilon_{sub.1}, \dots, \epsilon_{sub.q})^T$. (Walster: page 16 - the symbols are different, but it is the same teaching)

9. The method of claim 7, wherein if there exists no solution to the system of nonlinear equations, the method further comprises determining that the observation model $h(x_{vertline.c.sub.i})$ is false. (Walster: page 16 - the symbols are different, but it is the same teaching)

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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16. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

17. Claims 10-11, 21-22, 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walster in view of the taking of Official Notice.

18. Walster discloses the limitations as noted, but does not expressly disclose the use of linearization and Gaussian Reduction.

19. Official Notice is taken that it would have been obvious to one of ordinary skill in the art at the time of the invention to so modify Walster because these are standard and well known techniques for the solution of non-linear differential equations and for matrix reduction (which would be required to solve the matrix differential equations equations on page 16 of Walster).

Allowable Subject Matter

20. Claims 6, 17, 28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, and once all outstanding rejections/objections are traversed. The feature "wherein each condition c.sub.i is

not known precisely but is contained within an interval c.sup.I.sub.i." does not appear to be disclosed or suggested in the art of record.

Conclusion

21. Any inquiry concerning this communication or earlier communications from the examiner should be:

directed to: Dr. Hugh Jones telephone number (571) 272-3781,

Monday-Thursday 0830 to 0700 ET,

or

the examiner's supervisor, Kamini Shah, telephone number (571) 272-2279.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist, telephone number (703) 305-3900.

mailed to:

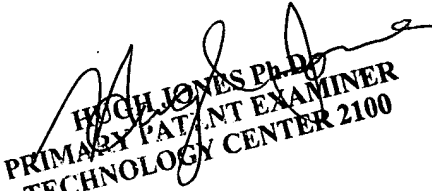
Commissioner of Patents and Trademarks
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or faxed to:

(703) 308-9051 (for formal communications intended for entry)

or (703) 308-1396 (for informal or draft communications, please label *PROPOSED* or *DRAFT*).

Dr. Hugh Jones
Primary Patent Examiner
August 17, 2006


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